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BOOK REVIEWS

Histoire de la Science Nautique Portugaise a l'Époque des grandes Decouvertes, Collection de Documents publiés par Ordre du Ministère de l'Instruction Publique de la Republique Portugaise, par Joaquim Bensaude.

- Vol. 1: *Regimento do Estrolabio e do quadrante—Tractado da Spera.* Munich, 1914. (From the unique copy in Munich; pp. 64; with introduction of pp. 2 + 31.)
- Vol. 2: *Tractado da Spera—Regimento da declinação do sol.* Geneva, s.a. (Copy of Evora; pp. 72.)
- Vol. 3: *Almanach perpetuum* (Radix, 1473); Abraham Zacuto—1496, Leiria. Munich and Bern, 1915. (Augsburg copy; pp. 335.)
- Vol. 4: *Tratado del Esphera y del arte del marear; con el Regimiento de las alturas;* Francisco Faleiro (Portugais) 1535 Sevilla. Munich and Bern, 1915. (Copy of Munich, pp. 102.)
- Vol. 5: *Tratado da Sphera;* Pedro Nunes—1537, Lisboa. Munich and Bern, 1915. (Copy of Wolfenbüttel; pp. 180.)
- Vol. 6: *Tabule tabularum Celestium motuum.* Supplement to Zacuto, *Almanach perpetuum*, transl. into Spanish by Joseph Vizinho. (Copy of Evora; pp. 35.) Leira, 1696, Geneva, s.a.
- Vol. 7: *Reportorio dos tempos;* by Valentim Fernandes ed. 1563, Lisboa. Geneva, s.a. (Copy of Lisbon; pp. 143.)

In each case the number of pages refers to the number given in facsimile.

The first two volumes, both of the first quarter of the sixteenth century, contain a Portuguese treatise on the sphere, following Sacroboscó, and variant forms of rules for the calculation of latitudes by means of the elevation of the sun, together with the necessary tables. Zacuto's *Almanach Perpetuum* contains material for astrological purposes, as do the corresponding tables of Regiomontanus, in addition to purely astronomical data useful for navigators.

A copy of the 1537 treatise on the sphere by Pedro Nunez is in the Huntington Library and has been photographically reproduced for a group of American libraries. The *Reportorio dos tempos* includes a *Regimento da declinação do sol*, taken from Zacuto, together with

astrological material, which predominates, and a few rules for navigators. A further facsimile volume to contain pertinent passages from the early tables of Regiomontanus is announced but not yet published.

Other volumes available in facsimile, which are quite indispensable to a study of the questions raised by Bensaude are the following:

Lisboa, João de: *Livro de marinaria*. Lisbon, 1900.

Castro, João de: *Roteiros*—(three).— Published in 1833, 1843, and 1882.

Pachecho, Duarte: *Esmeraldo de situ orbis*. Lisbon, 1892, also 1905.

Americans may justly feel flattered by the continued interest of European nations in the discovery period of American history. This interest is well attested by numerous magnificent series of publications issued with subsidies by foreign governments. During 1914 and 1915 there appeared a remarkably fine series of facsimile volumes having reference to the history of Portuguese nautical science in the discovery period. This series of seven volumes was published by order of the Portuguese minister of public instruction, and the volumes were issued during 1914 and 1915. Coming just at the outbreak of the war and during the great war these volumes have not received the attention of American scholars to the extent which the publications warrant. Similarly the work of the editor of the series, Joaquim Bensaude, on *L'astronomie nautique en Portugal a l'époque des grandes découvertes* (Bern, 1912) is a work which must receive the attention of all scholars who work in this field. This latter work received the Prix Binoux (*Histoire et philosophie des sciences*) in 1916.

To the scholarly initiative and to the financial sacrifice of Sr. Bensaude is due the series of facsimile volumes; the expense of publication was borne only in part by the Portuguese government.

While the volumes are concerned with nautical science it is primarily with the astronomical and cartographical phases of nautics that these volumes deal. The known authors are all of them men whose names appear in the history of astronomy of this period.

The volumes are concerned with the reasonable attempt to establish Portuguese nautical science as independent of the influence of Regiomontanus and Behaim. The final word of this controversy has not yet been said, as the mutual dependence upon Arabic and Jewish sources has not yet been elucidated. However, these documents reveal a much greater development in these sciences independent of German influence than has customarily been conceded in historical works treating this period. So much is granted by the foremost German

scholar in this field, Hermann Wagner, in an able summary, entitled *Die Entwicklung der wissenschaftlichen Nautik im Beginn des Zeitalters der Entdeckungen nach neueren Anschauungen* (Annalen der Hydrographie, Band 46, 1918).

The fundamental question concerns itself, primarily with the use of the astronomical tables of Abraham Zacuto and those of Regiomontanus by Portuguese and Spanish navigators. The Ephemerides of Regiomontanus have been prized by collectors of Americana as being used by Columbus for predicting eclipses and for other purposes; however, the tables of Zacuto appear more likely to have been used by Columbus. Printed copies appeared in 1496, 1500, and 1502; the University of Michigan has recently secured a copy of the Venice, Liechtenstein, edition of 1502, comprising 244 folios of which 3 (a₁ to a₁₁₁) containing title and introduction, are lacking. These copies of the tables are listed in American libraries in the *Census of Fifteenth Century Books owned in American Libraries* (New York, 1919).

Secondly, the practical handbooks such as the *Regimento do estrolabio* of the Munich library and the *Regimento da declinacam do sol* of the Evora library, used by navigators for determining latitude are now known to be largely independent of northern influence.

Another question under discussion concerns the earliest appearance of the loxodromic curve as being due to Pedro Nunes and not Mercator.

Bensaude has definitely established the dependence in the first half of the sixteenth century of Spanish nautical science upon Portuguese science. He has also demonstrated beyond possibility of doubt the development of Portuguese nautical science independently of the work of Regiomontanus and of Behaim.

Unfortunately only three hundred copies of the facsimile volumes were published and these have been distributed by the editor with the compliments of the Portuguese government to foreign and American libraries. Five of the volumes are out of print. The following American libraries have received the series: Smithsonian Institution; Carnegie Institution; Library of Congress; National Geographical Society; New York Public Library; Harvard University; Cornell University; Yale University; Johns Hopkins University; University of Boston; University of Michigan; University of California; Chicago Public Library; and the American Geographical Society.

A second volume on the history of Portuguese nautics is promised by Sr. Bensaude, but this has not yet appeared. If a sufficient number of subscriptions were received a new edition of the facsimile volumes

could undoubtedly be arranged. It is hoped that some American libraries may take the initiative in such an undertaking.

These questions as to the priority of German or Iberian scientists in nautical and astronomical matters cannot be finally answered until, as mentioned above, the work of the Arabs in these fields has received a just appreciation. A fairly monumental treatise now in course of publication bids fair to throw great light upon Arabic contributions to nautics; this is Gabriel Ferrand's *Instruccions Nautiques et routiers Arabes et Portugais des XV^e et XVI^e siècles, reproduits, traduits et annotés* (4 vols., 8°, Paris, Geuthner, 13, rue Jacob). This publication is eminently worthy of the support of all libraries interested in the discovery period. A more popular discussion of Arabic contributions to nautics, astronomy, and geography is to be found in Carra de Vaux's *Les Penseurs de l'Islam* (same publisher) of which the first two volumes (out of five) have appeared; the second volume treats the fields in question. The indebtedness of Regiomontanus to Arabic mathematicians and astronomers is well established. The notable contributions which he made to the science of the fifteenth century are also beyond dispute. Similarly the indebtedness of Iberian mathematics and astronomy to Moslem science is beyond dispute. The volumes under review reveal notable Portuguese contributions to the advancement of science and civilization.

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La Primera Centuria: Causas geográficas, políticas y económicas que han detenido el progreso moral y material del Perú en el primer siglo de su vida independiente. Tomo 11. By PEDRO DAVALOS Y LISSON. (Lima: Librería e Imprenta Gil, 1922. Pp. 487. £p. 1.)

The first volume of this work, which appeared in 1921, treated of present conditions in Peru. The present volume endeavors to analyze the geographical, political, and economic causes which have hindered the more rapid development of the Peruvian nation during its first century of independence.

The geographical chapters include detailed discussions of the rivers, mountains, coastal belt, montaña and sierra regions, means of communications, boundaries, and territorial extension. There are also extensive chapters on the classes of population, influences of climate, and prevalent diseases.